

SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES
CHASSIS & BODY



NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION PD

PROPELLER SHAFT & DIFFERENTIAL CARRIER

PD

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PROPELLER SHAFT & DIFFERENTIAL CARRIER

PROPELLER SHAFT AND CENTER BEARING

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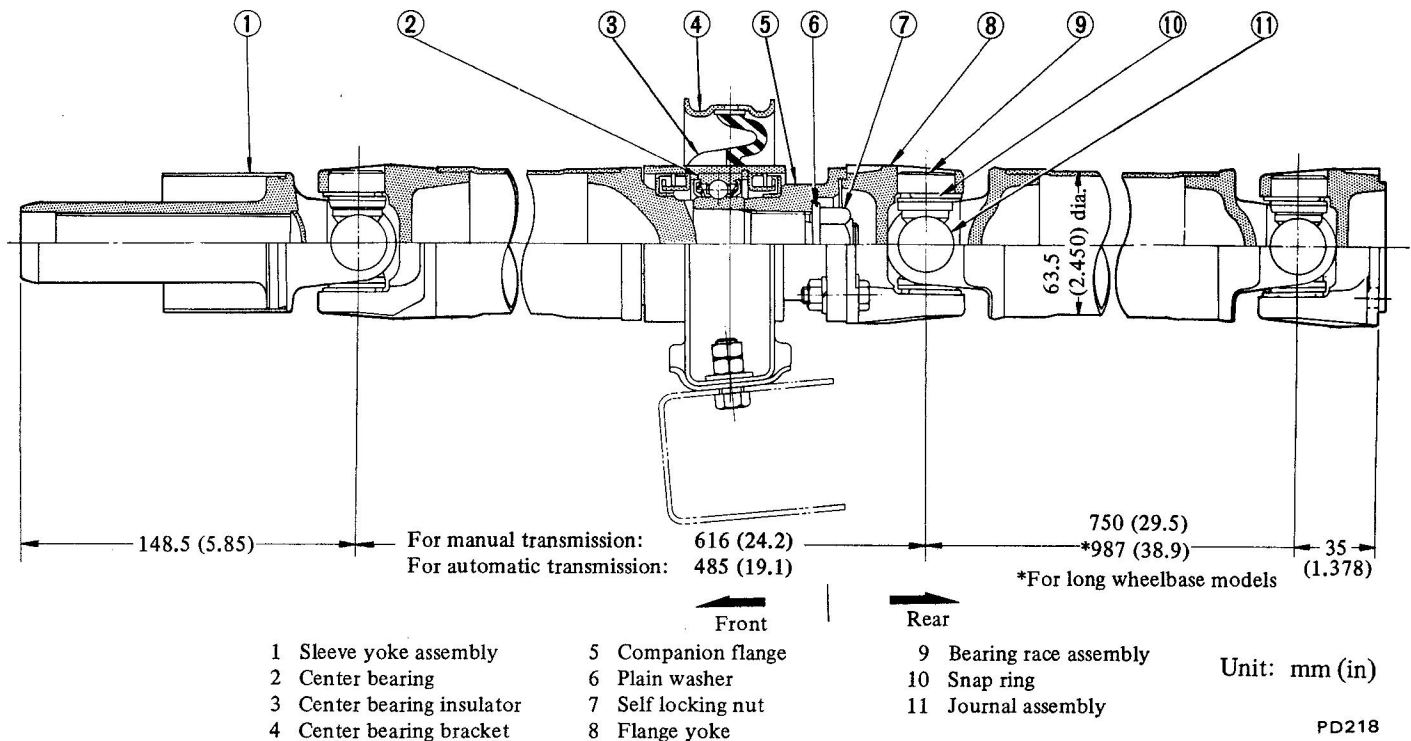


Fig. PD-1 Cross-sectional view of propeller shaft

DESCRIPTION

The propeller shaft on the 620 series is 3-joint type and is prepared three different length for manual transmission, automatic transmission and long wheelbase models.

The propeller shaft and universal joint assembly is carefully balanced during original assembly; that is, the dynamic unbalance is under 35 gr-cm (0.5 in-oz) at 5,800 rpm.

If the propeller shaft has to be assembled, it must be made carefully so that the above limit is not exceeded. Therefore, when the vehicle is to be undercoated, cover the propeller shaft and universal joints to prevent application of the undercoating material.

REMOVAL AND INSTALLATION

1. Raise vehicle on hoist. Mark relationship of shaft to companion flange so that shaft can be reinstalled in the same position.
2. Remove bolts retaining center bearing bracket.

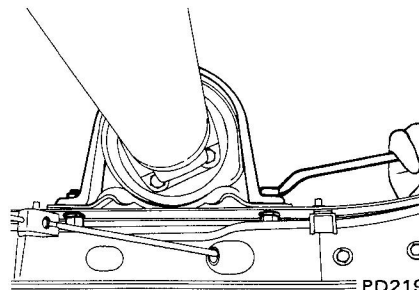


Fig. PD-2 Removing center bearing bracket

3. Remove bolts connecting shaft to companion flange.

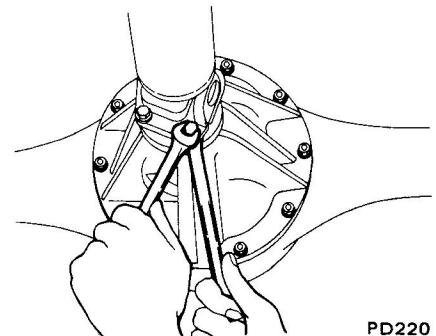


Fig. PD-3 Removing propeller shaft

4. Withdraw propeller shaft sleeve yoke from transmission by moving shaft rearward, passing it under rear axle.

PROPELLER SHAFT & DIFFERENTIAL CARRIER

Watch for oil leakage from transmission end.

Note: Remove propeller shaft carefully not so as to damage spline, sleeve yoke and rear oil seal.

To install, reverse the foregoing removal procedure.

1. Align propeller shaft with companion flange using reference marks prescribed in removal procedure and assemble with bolts.

Tightening torque:

2.0 to 2.7 kg-m
(14.5 to 19.5 ft-lb)

2. Insert bolts through the holes of center bearing bracket and torque nuts to retain center bearing on cross-member.

Tightening torque:

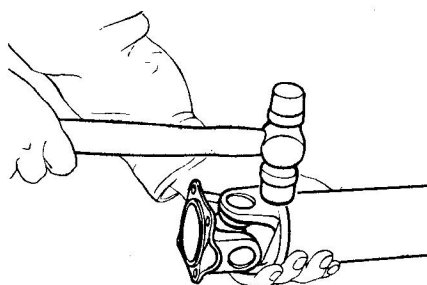
1.6 to 2.2 kg-m
(11.6 to 15.9 ft-lb)

DISASSEMBLY AND ASSEMBLY

Primarily, do not disassemble propeller shaft because it is balanced as an assembly.

However, check propeller shaft with journal for movement. When journal does not move smoothly, disassemble.

1. Mark relationship across propeller shaft and journal so that the original combination is restored at assembly.
2. Remove snap ring with a standard screwdriver.
3. Lightly tap base of yoke with a hammer, and withdraw bearing race.



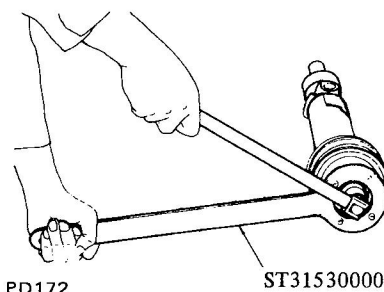
PD005

Fig. PD-4 Removing bearing

Note: When removing journal from yoke, be careful not to damage journal and yoke hole.

When disassembling and repairing center bearing are required, the following procedures are applied.

1. Mark relationship across flange and front propeller shaft. Remove bolts connecting flange yoke to companion flange.
2. Applying Drive Pinion Flange Wrench ST31530000, loosen off locking nut and remove center bearing.



PD172

ST31530000

Fig. PD-5 Removing lock nut

To assemble, reverse the foregoing procedure using reference marks prescribed in disassembly procedure.

New bearing need not be lubricated since it is lubricated for life. Fill joint with grease whenever propeller shaft is overhauled.

Use related snap rings of the same thickness and be sure that play is below 0.02 mm (0.0008 in).

Available snap ring

Thickness mm (in)	Color identification
2.00 (0.0788)	White
2.02 (0.0795)	Yellow
2.04 (0.0803)	Red
2.06 (0.0811)	Green
2.08 (0.0819)	Blue
2.10 (0.0827)	Right Brown
2.12 (0.0835)	No paint

Assembling should also be of such that the joint for freedom of movement is below 15 kg-cm (13 in-lb).

Center bearing assembling procedures are as follows:

1. Install center bearing in center bearing insulator.
2. Install center bearing assembly and companion flange on front shaft using reference marks established in disassembly procedure.
3. Install washer and lock nut on front shaft and tighten nut using Drive Pinion Flange Wrench ST31530000 to specified torque.

Tightening torque:

20 to 24 kg-m
(145 to 174 ft-lb)

4. Join companion flange of front shaft with flange yoke of rear shaft and tighten connect bolts to specified torque.

Tightening torque:

2.5 to 3.2 kg-m
(18.1 to 23.1 ft-lb)

5. Install center bearing bracket on center bearing.

INSPECTION

1. Check journal pin for dent or brinell marks, and yoke hole for sign of wear or damage.

Snap ring, bearing and seal ring should also be inspected to see if these are damaged, worn or deformed. Replace if necessary.

2. Check center bearing by rotating bearing race. If it is rough, noisy or damaged, discard. Cracked bearing insulator cannot be tolerated hear.

3. Check propeller shaft tube surface for dent or crack. Change if necessary.

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SERVICE DATA

Permissible dynamic unbalance	gr-cm (in-oz)	35 (0.5) at 5,800 rpm
Axial play of spider journal	mm (in)	Less than 0.02 (0.0008)
Journal swinging torque	kg-cm (in-lb).....	Less than 15 (13)
Propeller shaft (front and rear) out of round	mm (in)	Less than 0.6 (0.024)
Tightening torque		
Shaft to companion flange (Gear carrier) bolt	kg-m (ft-lb)	2.0 to 2.7 (14.5 to 19.5)
Companion flange fixing nut (front shaft)	kg-m (ft-lb)	20 to 24 (145 to 174)
Flange yoke (rear shaft) to companion flange (front shaft) bolt	kg-m (ft-lb)	2.5 to 3.2 (18.1 to 23.1)
Center bearing bracket to cross member bolt	kg-m (ft-lb)	1.6 to 2.2 (11.6 to 15.9)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Vibration during at medium or high speed.	Worn or damaged universal joint needle bearing.	Replace.
	Unbalance due to bent or dented propeller shaft.	Replace.
	Loose propeller shaft installation.	Retighten.
	Worn transmission rear extension bushing.	Replace.
	Damaged center bearing or insulator.	Replace.
	Tight universal joints.	Impact yokes with hammer to free up. Replace joint if unable to free up or if joint feels rough when rotated by hand.
	Undercoating or mud on the shaft causing unbalance.	Clean up shaft.
	Tire unbalance.	Balance wheel and tire assembly or replace from known good vehicle.
Knocking sound during starting or noise during coasting on propeller shaft.	Balance weights missing.	Replace.
	Worn damaged universal joint.	Replace.
	Worn sleeve yoke and main shaft spline.	Replace.
	Loose propeller shaft installation.	Retighten.
	Loose joint installation.	Adjust snap ring.
	Damaged center bearing or insulator.	Replace.
Scraping noise.	Loose or missing bolts at center bearing bracket to body.	Replace or tighten bolts.
	Dust cover on sleeve yoke rubbing on transmission rear extension. Dust cover on companion flange rubbing on differential carrier.	Straighten out dust cover to remove interference.
Whine or whistle	Damaged center bearing.	Replace.

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DIFFERENTIAL CARRIER

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DESCRIPTION

The differential gear carrier assembly on the 620 series is prepared three different gear ratio as follows:

Applied models	Gear ratio
L16 engine model	
Manual transmission	4.375
Automatic transmission	4.625
J15 engine model	
Pick-up	4.625 (4.875 opt.)
Double pick-up	4.375
J13 engine model	
Pick-up	4.875
Double pick-up	4.625

The gear carrier is of light aluminum alloy. The final drive has a hypoid type ring gear and drive pinion.

The drive pinion is mounted in two tapered roller bearings which are preloaded by a collapsible spacer during assembly.

The drive pinion is positioned by a shim located between a shoulder on the drive pinion and the rear bearing.

The differential case is supported in the carrier by two tapered roller side bearings. These are preloaded by inserting shims between the bearings and the differential case. The differential case assembly is positioned for proper ring gear and drive pinion backlash by varying these shims. The ring gear is bolted to the differential case. The case houses two side gears in mesh

with two pinions and thrust block mounted on a pinion shaft. The pinion shaft anchored in the case by lock pin. The pinions and side gears are backed by thrust washers.

Renew the oil for the first 1,000 km (600 miles) of operation. The oil should then be changed every 50,000 km (30,000 miles) maximum. The lubricant should be checked each 5,000 km (3,000 miles) and replenished as necessary.

Note: Replacement of front oil seal with differential gear carrier assembly installed on the vehicle must not be allowed due to used collapsible spacer on its model.

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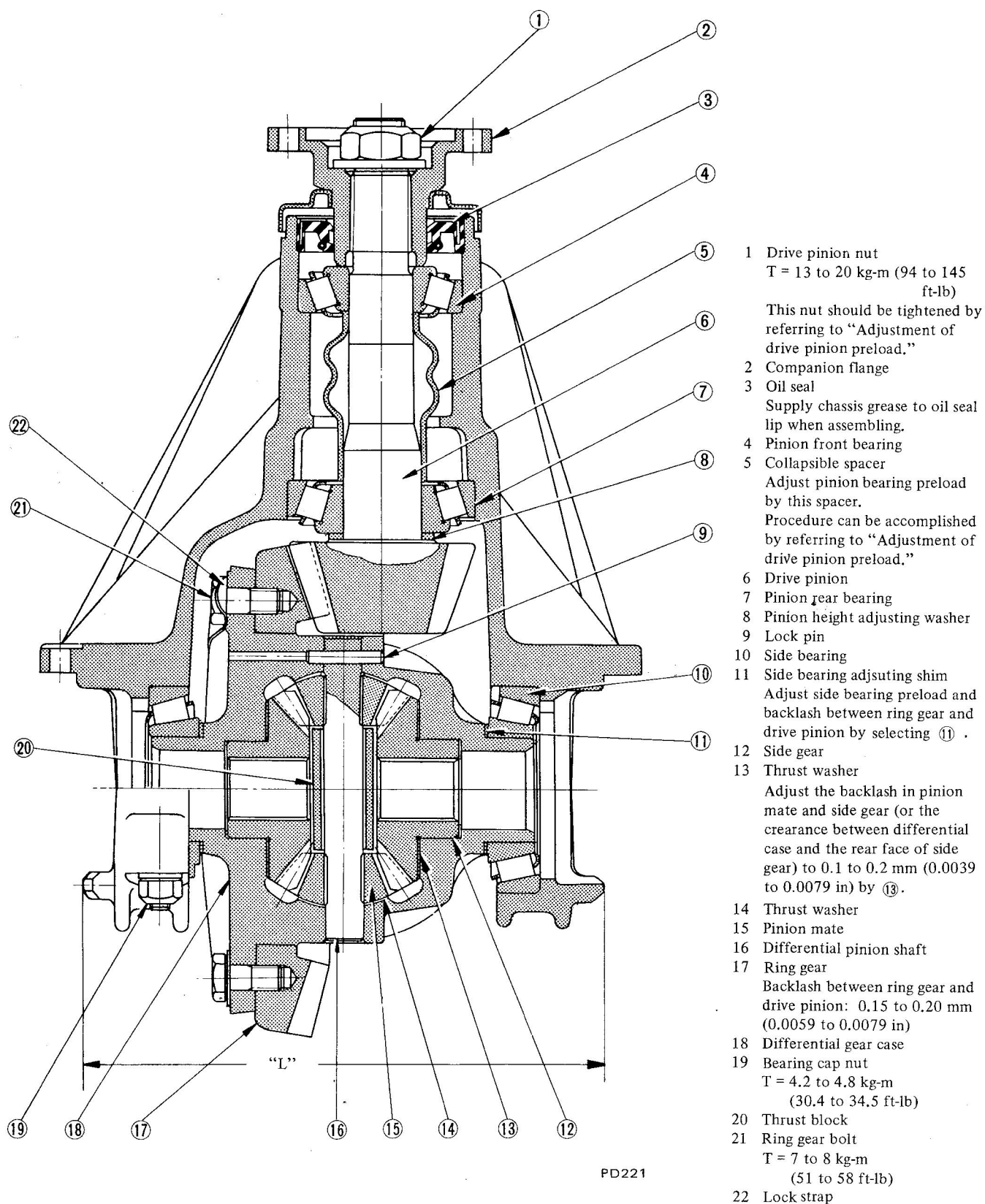
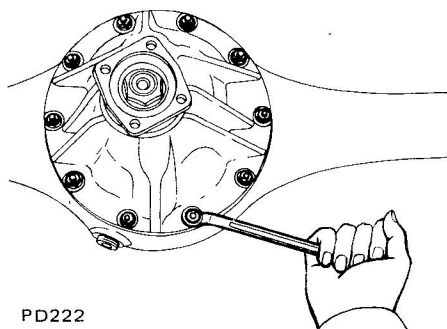


Fig. PD-6 Cross-sectional view of differential carrier

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REMOVAL AND INSTALLATION

1. Jack up rear of vehicle and support under rear axle case on stand. Drain gear oil.
2. Remove propeller shaft and rear axle shafts. These works can be done by referring to "REAR AXLE."
3. Loosen off nuts securing differential to axle housing, and take out differential gear carrier assembly.



PD222

Fig. PD-7 Removing differential gear carrier

Installing can be proceeded in the reverse order of removal procedure.

Tightening torque:

Gear carrier to rear axle case fix nut:

2.0 to 2.5 kg-m
(14.5 to 18.1 ft-lb)

Companion flange to propeller shaft fix bolt:

2.0 to 2.7 kg-m
(14.5 to 19.5 ft-lb)

Drain and filler plug:

6 to 10 kg-m
(43.4 to 72.3 ft-lb)

Gear oil quantity:

1.0 liter
(1 U.S.qt, $\frac{3}{8}$ Imp.qt)

PRE-DISASSEMBLY INSPECTION

Differential case or carrier should be inspected before any parts are removed from it.

These inspections can help to find the cause of the trouble and to determine the corrections needed.

1. Mount carrier on Gear Carrier Attachment ST06310000 (or Differential carrier stand ST0732S000).

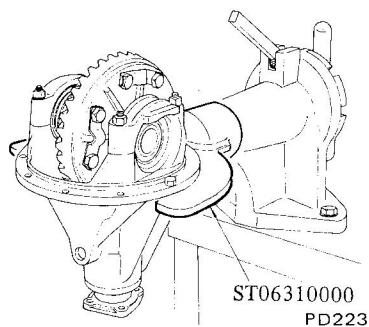


Fig. PD-8 Holding differential carrier

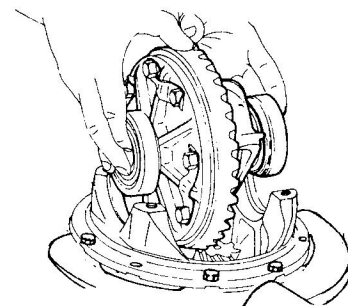
2. Visually inspect parts for wear or damage.
3. Rotate gears to see if there is any roughness which would indicate damaged bearings or chipped gears. Check the gear teeth for scoring or signs of abnormal wear. Measure preload of drive pinion.
4. Set up a dial indicator and check the backlash at several points around ring gear. Backlash should be within 0.15 to 0.2 mm (0.0059 to 0.0079 in).
5. Check the gear tooth contact with a mixture powdered red lead and oil apply sparingly to all ring gear teeth.

For the tooth contact pattern, see paragraph dealing with tooth contact pattern adjustment.

6. Check runout of the ring gear at the rear of it if the backlash or the gear tooth contact pattern is found abnormal. Runout limit 0.05 mm (0.0020 in).

DISASSEMBLY AND ASSEMBLY /ADJUSTMENT

1. Mark relationship of side bearing cap to carrier, and remove side bearing caps and take out differential case assembly.

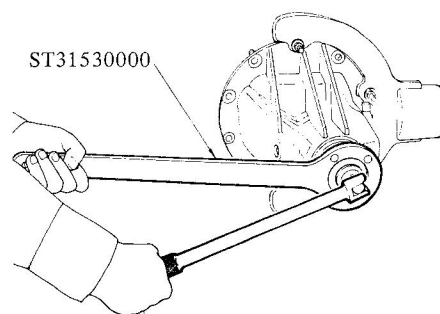


PD203

Fig. PD-9 Removing differential case assembly

Note: Care should be taken not to confuse the left and right hand bearing caps and bearing outer race so that reassembly will be easily carried out with the same parts in the original position.

2. Remove drive pinion nut using Drive Pinion Flange Wrench ST31530000, and pull off companion flange using a standard puller.



PD225

Fig. PD-10 Removing drive pinion nut

3. Extract drive pinion assembly to the rearwards by tapping the front end with a soft hammer. Drive pinion can be taken out together with rear bearing inner race, bearing spacer and washer.
4. Remove oil seal and take out front bearing inner race.

Note: Reuse of a oil seal must not be allowed.

5. Hold rear bearing inner race with Drive Pinion Rear Bearing Inner Race Puller ST30031000 and extract from drive pinion with a press.

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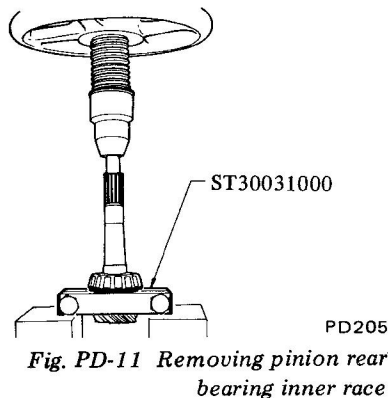


Fig. PD-11 Removing pinion rear bearing inner race

6. To remove outer races of both front and rear bearing, apply a brass drift to race side surface, and withdraw them by tapping the top of drift with a hammer.

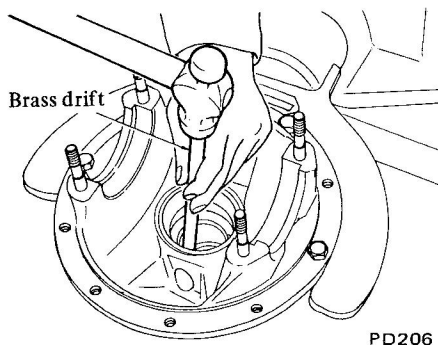


Fig. PD-12 Removing pinion front and rear bearing outer race

Disassembling differential case

1. When replacing side bearing, using Gear Carrier Side Bearing Puller ST3306S001 or ST3306S000 (set of ST33051001 and ST33061000).

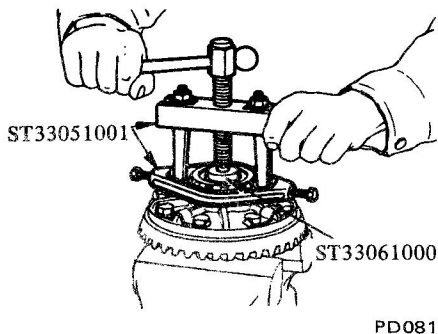


Fig. PD-13 Removing side bearing

Notes:

- Puller should be handled with care in catching the edge of bearing inner race.
- Care should be taken not to confuse left and right hand parts.

- Remove ring gear by spreading out lock strap and loosening ring gear bolts in diagonally.
- Punch off pinion mate shaft lock pin from ring gear side using Solid Punch ST23510000.

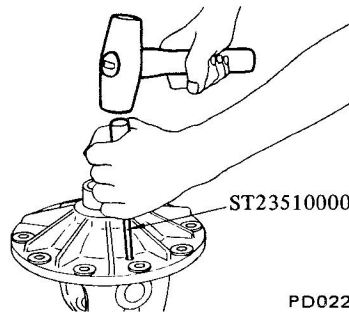


Fig. PD-14 Removing lock pin

Note: Lock pin is caulked at pin hole mouth on differential case. Do not punch it off forcibly without checking how it is caulked.

- Draw out pinion mate shaft and remove thrust block, pinion mate gears, side gears and thrust washers.

Note: The gear as well as thrust washers should be marked or preserved separately as left and right, front and rear.

Assembly can be proceeded in the reverse order of disassembling. The following directions as to adjustment and usage of special tools will make it possible to obtain a perfect differential operation.

Precaution in reassembly

- Arrange shims, washers and the like in order so that they will be installed correctly.
- Thoroughly clean the surfaces on which shims, washers, bearings and bearing caps will be installed.

- Apply gear oil when installing bearings.
- Pack grease cavity between lips when fitting oil seal.

Assembling differential gear case

- Assemble pinion mates, side gears, thrust block and thrust washers in differential case.
- Fit pinion shaft to differential case so that it meets lock pin holes.
- Adjust the backlash in pinion mate and side gear (or the clearance between the rear face of side gear and thrust washer) within 0.1 to 0.2 mm (0.0039 to 0.0079 in) by selecting side gear thrust washer.

Side gear thrust washer

Thickness mm (in)
0.75 to 0.80 (0.0295 to 0.0315)
0.80 to 0.85 (0.0315 to 0.0335)
0.85 to 0.90 (0.0335 to 0.0354)
0.90 to 0.95 (0.0354 to 0.0374)

- Lock pinion shaft lock pin using a punch after it is secured into place.
 - Apply oil to gear tooth surfaces and thrust surfaces and check if they turn properly.
 - Place ring gear on differential case and install bolts and lock washers.
- Torque bolts to specification, and bend up lock washers.

Tightening torque:

7 to 8 kg-m
(51 to 58 ft-lb)

Notes:

- Only genuine drive gear bolts and new lock washers must be used.
- Tighten bolts in diagonal order while lightly tapping around bolt heads with a hammer.

- When replacing side bearing, measure bearing width using a about 2.5 kg (5.5 lb) weight block prior to installation.

Normal bearing width:

20.00 mm (0.7874 in)

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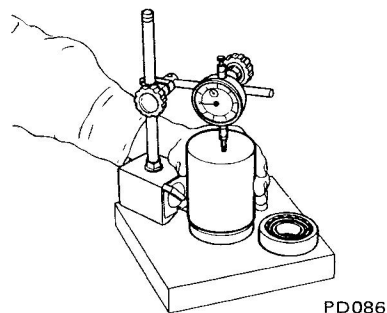


Fig. PD-15 Measuring bearing width

Adjustment of bearing height

Adjust the pinion height with washer provided between rear bearing inner race and the back of pinion gear.

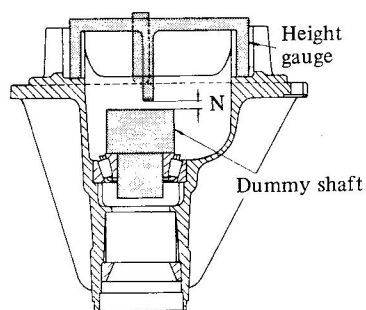
1. Press fit front and rear bearing outer races into gear carrier using Drive Pinion Outer Race Drift Set ST30611000, ST30612000 and ST30613000.

Front: ST30611000 and ST30612000

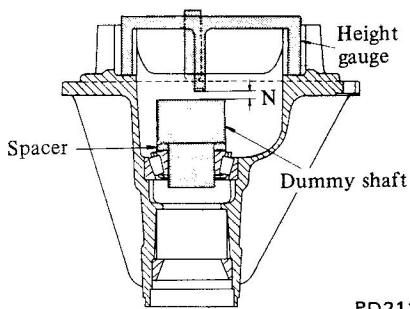
Rear: ST30611000 and ST30613000

2. Fit rear bearing on carrier and install Dummy Shaft ST31942000 on rear bearing, and place Height Gauge ST31941000 on carrier.

When using Height Gauge for 521 model, install Dummy Shaft ST31942000 and Spacer ST31102000 on rear bearing, and place Height Gauge ST31101000 (Former ST31100000) for 521 model.



PD210

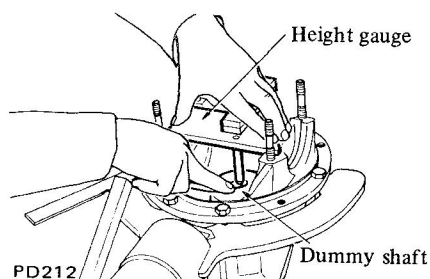


PD211

Use Height Gauge for 521 model.

Fig. PD-16 Adjusting pinion height

3. Measure the clearance (N) between the tip end of height gauge and the end surface of dummy shaft, using a thickness gauge.



PD212

Fig. PD-17 Measuring clearance

4. The thickness of drive pinion height adjusting washers can be obtained from the following formula:

$$T = N - [(H - D' - S) \times 0.01] + 2.18$$

Where,

T = Required thickness of rear bearing adjusting washers (mm).

N = Measured value with thickness gauge (mm).

H = Figure marked on the drive pinion head.

D' = Figure marked on the dummy shaft.

S = Figure marked on the height gauge.

Figures for H, D' and S are dimensional variations in a unit of 1/100 mm against each standard measurement.

Example,

$$N = 0.3 \text{ mm}$$

$$H = +1, \quad D' = -1, \quad S = 0$$

$$T = 0.3 - [(1 + 1 - 0) \times 0.01] + 2.18 = 2.46 \text{ mm}$$

The correct washer: Thickness 2.46 mm (0.0969 in).

Pinion height adjusting washer

Thickness mm (in)

2.37 (0.0933)

2.40 (0.0945)

2.43 (0.0957)

2.46 (0.0969)

2.49 (0.0980)

2.52 (0.0992)

2.55 (0.1004)

2.58 (0.1016)

2.61 (0.1028)

2.64 (0.1039)

2.67 (0.1051)

2.70 (0.1063)

2.73 (0.1075)

2.76 (0.1087)

2.79 (0.1098)

2.82 (0.1110)

2.85 (0.1122)

2.88 (0.1134)

2.91 (0.1146)

2.94 (0.1158)

2.97 (0.1169)

5. Fit determined pinion height adjusting washer in drive pinion, and press fit rear bearing inner race in it, using Base ST30032000.

Adjustment of drive pinion preload

Adjust the preload of drive pinion with collapsible spacer.

This procedure has nothing to do with thickness of pinion height adjusting washer.

Note: Reuse of a collapsible spacer must not be allowed.

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1. After adjusting pinion height, lubricate front bearing with gear oil and place it in carrier.
2. Install a new oil seal in carrier. Lubricate cavity between seal lips with grease when installing.
3. Place a new collapsible spacer on drive pinion and lubricate pinion rear bearing with gear oil.
4. Insert companion flange into oil seal and hold it firmly against pinion front bearing cone. From the rear of the carrier, insert drive pinion into companion flange.
5. Ascertain that threaded portion of drive pinion, a new pinion nut and washer are free from oil or grease.
6. Holding companion flange with Drive Pinion Flange Wrench ST31530000, tighten nut and then drive pinion is pulled into front bearing cone and into flange.

As drive pinion is pulled into front bearing cone, drive pinion end play is reduced. While there is still end play in drive pinion, companion flange and cone will be felt to bottom. This indicates that bearing cone and companion flange have bottomed on collapsible spacer.

From this point, a much greater torque must be applied to turn pinion nut since spacer must be collapsed. From this point, nut should also be tightened very slowly and drive pinion end play checked often so that pinion bearing preload does not exceed the limits.

When the drive pinion end play is eliminated, the specified preload is being approached. Replace collapsible spacer if this specification is exceeded.

Note: Do not decrease preload by loosening pinion nut. This will remove compression between pinion front and rear bearing cones and collapsible spacer and may permit front bearing cone to turn on drive pinion, moreover, nut becomes loose.

7. Turn drive pinion in both directions several times to set bearing roll-

ers. And adjust bearing preload to specifications.

Tightening torque of pinion nut:
13 to 20 kg-m
(94.0 to 144.6 ft-lb)

Preload (with oil seal):
7 to 15 kg-cm
(6.1 to 13.0 in-lb)

At companion flange bolt hole:
2.0 to 4.3 kg
(4.5 to 9.5 lb)

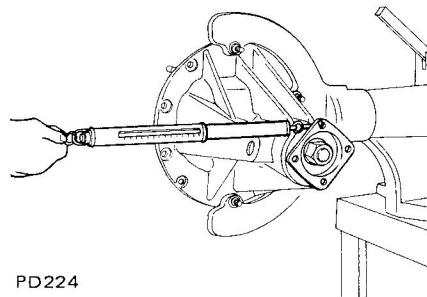


Fig. PD-18 Measuring pinion preload

Adjustment of side bearing shims

1. If hypoid gear set, carrier, differential case or side bearing have been replaced with new ones, adjust the side bearing preload with adjusting shim.

The required thickness of adjusting shim can be calculated by the following formula.

$$T_1 = (A - C + D - H') \times 0.01 + 0.175 + E$$

$$T_2 = (B - D + H') \times 0.01 + 0.150 + F$$

Where,

T_1 = Required thickness of left side bearing adjusting shim (mm).

T_2 = Required thickness of right side bearing adjusting shim (mm).

A = Figure marked on the left side bearing housing of gear carrier.

B = Figure marked on the right side bearing of gear carrier.

C & D = Figure marked on the differential case.

E & F = These are differences in width of left or right side bearing against the standard width (mm).

H' = Figure marked on the ring gear.

Figures for A, B, C, D and H' are dimensional variations in a unit of

1/100 mm against each standard measurement.

Note: Preload of old bearing is to adopt the same value as that of a new bearing.

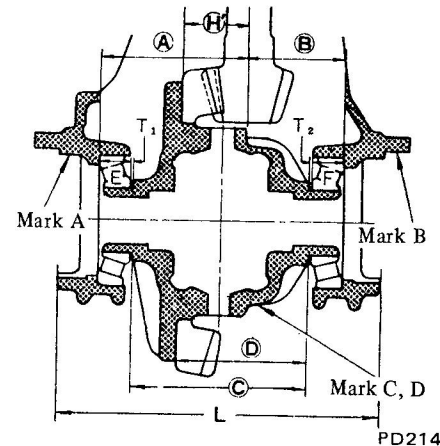


Fig. PD-19 Thickness of shim on left and right side

Example,

$$\begin{aligned} A &= 1, & B &= 2, & C &= 2, & D &= 3 \\ E &= +0.02 \text{ mm}, & F &= -0.01 \text{ mm}, \\ H' &= +1 \end{aligned}$$

Left side

$$\begin{aligned} T_1 &= (A - C + D - H') \times 0.01 \\ &\quad + 0.175 + E \\ &= (1 - 2 + 3 - 1) \times 0.01 \\ &\quad + 0.175 + 0.02 \\ &= 0.205 \text{ mm} \end{aligned}$$

Right side

$$\begin{aligned} T_2 &= (B - D + H') \times 0.01 + 0.150 + F \\ &= (2 - 3 + 1) \times 0.01 + 0.150 \\ &\quad - 0.01 \\ &= 0.14 \text{ mm} \end{aligned}$$

Thickness mm (in)
0.05 (0.0020)
0.07 (0.0028)
0.10 (0.0039)
0.20 (0.0079)
0.50 (0.0197)

2. Fit determined side bearing adjusting shim on differential case, and press fit left and right side bearing inner races on it, using Side Bearing Drift ST33230000 and Adapter ST33061000.

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3. Install differential case assembly into gear carrier, tapping with a rubber mallet.

4. Align mark on bearing cap with that on gear carrier, and install bearing cap on carrier. And tighten nuts to specified torque.

Tightening torque:

4.2 to 4.8 kg-m
(30.4 to 34.7 ft-lb)

5. Measure "L" dimension (between left and right bearing cap edges) by Side Bearing Cap Gauge ST32110001 or a micrometer.

"L" dimension:

198.40 to 198.55 mm
(7.8110 to 7.8196 in)

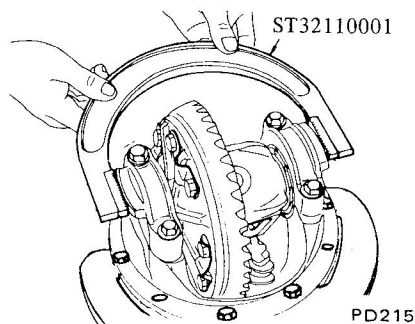


Fig. PD-20 Measuring "L" dimension

6. Measure backlash in ring gear and drive pinion.

If backlash is too small, remove shims from left side and add them to right side. To reduce backlash, remove shims from right side and add them to left side.

Backlash:

0.15 to 0.20 mm
(0.0059 to 0.0079 in)

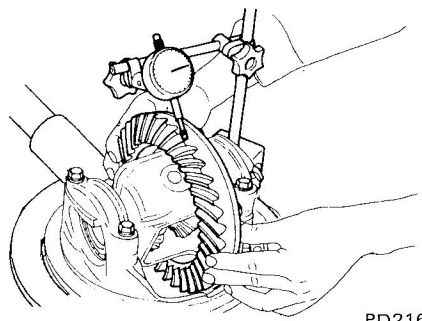


Fig. PD-21 Measuring backlash

7. Check the runout of ring gear side is within 0.05 mm (0.0020 in) total indicator reading.

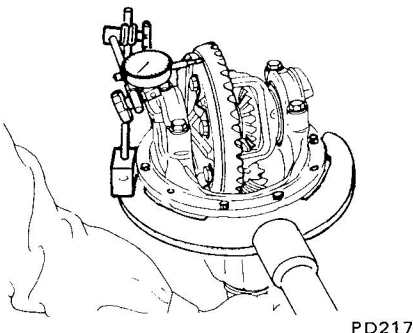


Fig. PD-22 Measuring runout of ring gear

8. At the same time, check bearing preload. Bearing preload should read 8 to 21 kg-cm (6.95 to 18.24 in-lb) of rotating torque [2.3 to 6.0 kg (5.1 to 13.0 lb) at companion flange bolt hole].

If preload does not accord with this specification, adjust it with side bearing shims.

9. Check and adjust the tooth contact pattern of ring gear and drive pinion.

(1) Thoroughly clean ring and drive pinion gear teeth.

(2) Paint ring gear teeth lightly and evenly with a mixture of powdered red lead and oil of a suitable consistency to produce a contact pattern.

(3) Rotate pinion through several revolutions in the forward and reverse direction until a definite contact pattern is developed on ring gear.

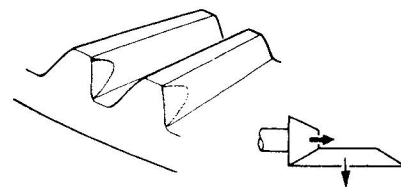
(4) When contact pattern is incorrect, readjust thickness of adjust shim.

Be sure to wipe out red lead completely upon completion of adjustment.

(5) Incorrect contact pattern of teeth can be adjusted in the following manner.

a. Heal contact

To correct, increase thickness of drive pinion adjusting washer in order to bring drive pinion close to ring gear.

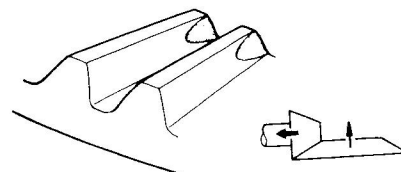


PD193

Fig. PD-23 Heal contact

b. Toe contact

To correct, reduce thickness of drive pinion adjusting washer in order to make drive pinion go away from ring gear.

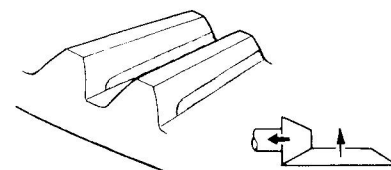


PD194

Fig. PD-24 Toe contact

c. Flank contact

Adjust in manner similar to b.

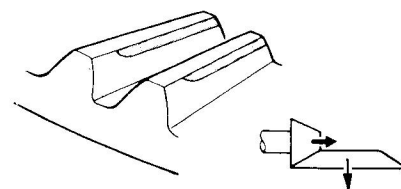


PD195

Fig. PD-25 Flank contact

d. Face contact

Adjust in manner similar to a.

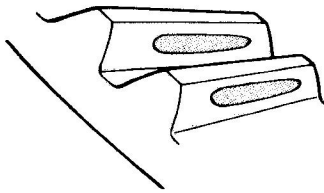


PD196

Fig. PD-26 Face contact

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e. Correct tooth contact



PD197

Fig. PD-27 Correct contact

Note: Change in thickness of adjusting washer is accompanied by change in backlash. Check it when installing gear.

INSPECTION

Thoroughly clean all disassembled parts, and examine them to see if they are worn, damaged or otherwise defective, and how they are affected. Repair or replace all defective parts, whichever is necessary.

1. Check gear teeth for scoring, cracking and chipping, and make sure that tooth contact pattern indicates correct meshing depth. If any defect is evident, replace parts as required.

Note: Drive pinion and ring gear are supplied for replacement as a set, therefore, should either part be damaged, replace as a set.

2. Check pinion gear shaft, and pinion gear for scores and signs of wear, replace as required.

Follow the same procedure for side gear and their seats on differential case.

3. Inspect all bearing races and rollers for scoring, chipping or evidence of excessive wear. They should be in tiptop condition such as not worn and with mirror-like surfaces. Replace if there is a shadow of doubt on their efficiency, as an incorrect bearing operation may result in noisiness and gear seizure.

4. Inspect thrust washer faces.

Small defects can be corrected with sand paper. In case the backlash

in pinion mate and side gear (or the clearance between side gear and thrust washer) exceeds 0.1 to 0.2 mm (0.0039 to 0.0079 in), replace thrust washer. Four kinds of thrust washers are available.

5. Inspect carrier and differential case for cracks or distortion. If either condition is evident, replace defective parts.

6. As a general rule, oil seal should be replaced at each disassembly.

TROUBLE DIAGNOSES AND CORRECTIONS

When a gear carrier is suspected of being noisy it is advisable to make a thorough test to determine whether the noise originates in the tires, road surface, exhaust, universal joint, propeller shaft, wheel bearing, transmission, or gear carrier. Noise which originates in other places cannot be corrected by adjustment or replacement of parts in the rear axle assembly.

Condition	Probable cause	Corrective action
Noise on drive, coast and float.	Shortage of oil.	Supply gear oil. Rebuild gear carrier if necessary.
	Incorrect tooth contact between ring gear and drive pinion.	Adjust tooth contact or replace the hypoid gear set.
	Incorrect backlash between ring gear and drive pinion.	Adjust backlash or replace the hypoid gear set if necessary.
	Seized up or damaged ring gear and drive pinion.	Replace the hypoid gear set.
	Seized up, damaged or broken drive pinion bearing.	Replace the pinion bearing and defective parts.
	Seized up, damaged or broken side bearing.	Replace the side bearing and defective parts.
	Loosen clamp bolts or nuts holding ring gear, bearing cap, etc..	Clamp them to specified torque, and replace defective parts.

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Condition	Probable cause	Corrective action
Noise on turn	<p>Seized up, damaged or broken side and pinion gear.</p> <p>Seized up, damaged or broken side gear and pinion thrust washer.</p> <p>Pinion gears too tight on their shaft.</p>	<p>Replace defective parts.</p> <p>Replace defective parts.</p> <p>Replace defective parts.</p>
Knocking sound during starting or gear shifting.	<p>Excessive backlash</p> <p>Incorrect backlash between ring gear and drive pinion, or side and pinion gear.</p> <p>Worn gears or case.</p> <p>Worn rear axle shaft and side gear spline.</p> <p>Pinion bearing under preload.</p> <p>Loosened drive pinion nut.</p> <p>Loosen clamp bolts or nuts holding ring gear, bearing cap, etc..</p>	<p>Adjust backlash.</p> <p>Replace worn parts.</p> <p>Replace worn parts.</p> <p>Adjust preload.</p> <p>Repair or replace.</p> <p>Clamp them or replace if necessary.</p>
Seizure or breakage.	<p>Shortage of oil or use of unsuitable oil.</p> <p>Excessively small backlash.</p> <p>Incorrect adjustment of bearings or gears.</p> <p>Severe service due to an excessive loading, improper use of clutch.</p> <p>Loosened bolts and nuts, such as ring gear clamp bolts.</p>	<p>Replace defective parts.</p> <p>Adjust backlash and replace as required.</p> <p>Replace defective parts.</p> <p>Replace defective parts.</p> <p>Replace defective parts.</p>
Oil leakage.	<p>Worn-out, damaged or improperly driven front oil seal, or bruised, dented or abnormally worn slide face of companion flange.</p> <p>Loosened bolts holding gear carrier.</p> <p>Defective gasket.</p> <p>Loosen filler or drain plug.</p> <p>Clogged or damaged breather.</p>	<p>Replace the defective oil seal. Ammend the affected flange with sand paper or replace if necessary.</p> <p>Tighten the bolts to specified torque.</p> <p>Replace defective parts with new ones.</p> <p>Tighten the plug.</p> <p>Repair or replace.</p>

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SERVICE DATA AND SPECIFICATIONS

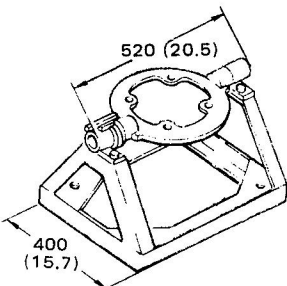

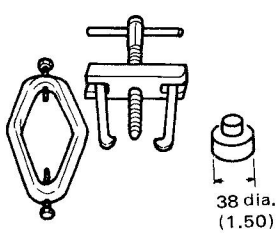
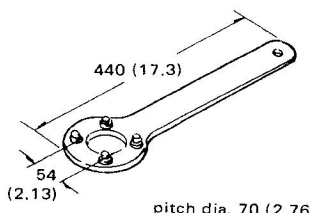
Nominal diameter of ring gear	190
Gear carrier material	Aluminum alloy
Final gear type	Hypoid
Gear ratio (number of teeth)	
With L16 engine model	
Manual transmission	4.375 (35/8)
Automatic transmission	4.625 (37/8)
With J15 engine model	
Pick-up	4.625 (37/8) [4.875 Opt. (39/8)]
Double pick-up	4.375 (35/8)
With J13 engine model	
Pick-up	4.875 (39/8)
Double pick-up	4.625 (37/8)
Drive pinion	
Preload (with oil seal) kg-cm (in-lb)	7 to 15 (6.1 to 13.0)
At companion flange bolt hole (with oil seal) kg (lb)	2.0 to 4.3 (4.5 to 9.5)
Thickness of pinion height adjusting washer	
	<hr/> Thickness mm (in) <hr/>
	2.37 (0.0933)
	2.40 (0.0945)
	2.43 (0.0957)
	2.46 (0.0969)
	2.49 (0.0980)
	2.52 (0.0992)
	2.55 (0.1004)
	2.58 (0.1016)
	2.61 (0.1028)
	2.64 (0.1039)
	2.67 (0.1051)
	2.70 (0.1063)
	2.73 (0.1075)
	2.76 (0.1087)
	2.79 (0.1098)
	2.82 (0.1110)
	2.85 (0.1122)
	2.88 (0.1134)
	2.91 (0.1146)
	2.94 (0.1157)
	<hr/> 2.97 (0.1169) <hr/>

PROPELLER SHAFT & DIFFERENTIAL CARRIER

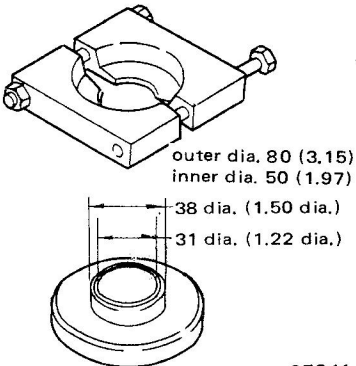
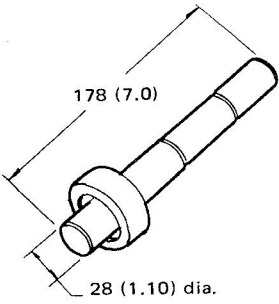
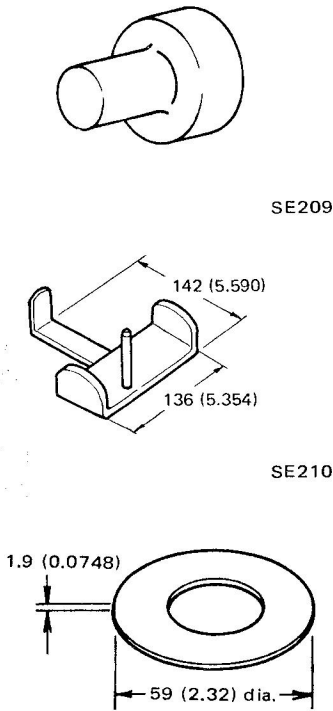
Pinion bearing adjusting spacer		Non adjustable collapsible spacer
Side gear and pinion mate		
Thickness of side gear thrust washer		<div>Thickness mm (in)</div> <div>0.75 to 0.80 (0.0295 to 0.0315)</div> <div>0.80 to 0.85 (0.0315 to 0.0335)</div> <div>0.85 to 0.90 (0.0335 to 0.0354)</div> <div>0.90 to 0.95 (0.0354 to 0.0374)</div>
Backlash in pinion mate and side gear (or clearance between side gear and thrust washer)	mm (in)	0.1 to 0.2 (0.0039 to 0.0079)
Ring gear		
Backlash between ring gear and drive pinion	mm (in)	0.15 to 0.20 (0.0059 to 0.0079)
Runout of rear side of ring gear	mm (in)	Less than 0.05 (0.0020) total indica- tor reading
Thickness of side bearing adjusting shim	mm (in)	<div>Thickness mm (in)</div> <div>0.05 (0.0020)</div> <div>0.07 (0.0028)</div> <div>0.10 (0.0039)</div> <div>0.20 (0.0079)</div> <div>0.50 (0.0197)</div>
Side bearing standard width	mm (in)	20.0 (0.7874)
“L” dimension	mm (in)	198.40 to 198.55 (7.8110 to 7.8169)
Tightening torque		
Drive pinion nut	kg-m (ft-lb)	13 to 20 (94.0 to 144.6)
Ring gear bolt	kg-m (ft-lb)	4.8 to 5.5 (34.7 to 39.8)
Side bearing cap nut	kg-m (ft-lb)	4.2 to 4.8 (30.4 to 34.7)
Companion flange to propeller shaft fix bolt	kg-m (ft-lb)	2.0 to 2.7 (14.5 to 19.5)
Oil drain and filler plug	kg-m (ft-lb)	6 to 10 (43.4 to 72.3)
Oil capacity (about)		1.0 liter (1 U.S.qt, ¾ Imp.qt)
Adjusting methods		
Variation numbers expressed by	mm (× 0.01)	
Dummy shaft	Use	
Drive pinion adjusting formula	$T = N - [(H - D' - S) \times 0.01] + 2.18$	
Side bearing adjusting formula	$T_1 = (A - C + D - H') \times 0.01$ $+ 0.175 + E$ $T_2 = (B - D + H') \times 0.01 + 0.150 + F$	

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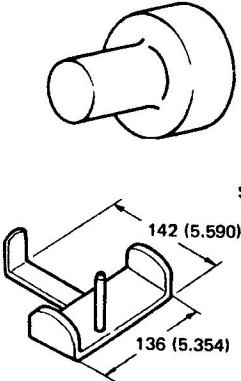
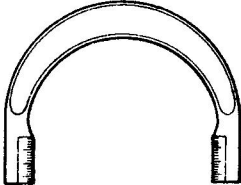
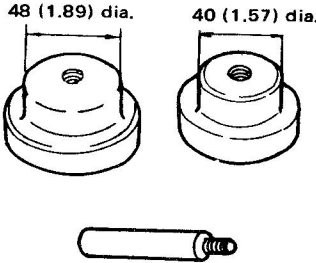
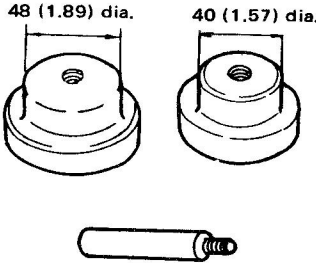

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1.	ST0732S000 Gear carrier stand assembly — ST07321000 Stand — ST07311000 Attachment	 SE100	620 521 230 130	Page PD-7
2.	ST06310000 Gear carrier attachment	 SE023	620 V610 W510 230	Fig. PD-8
3.	ST3306S001 (Former Tool No.) (ST3306S000) Diff. side bearing puller — ST33051001 Body — ST33061000 Adapter	 SE049	620 521 V610 W510 S30 C30 230 GC10	Page PD-8 Fig. PD-13 Page PD-10
4.	ST31530000 Drive pinion flange wrench	 SE213	620 521 610 510 S30 230 C10	Page PD-3 Fig. PD-5 Fig. PD-10 Page PD-10

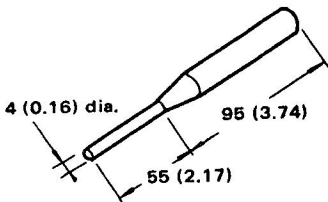
PROPELLER SHAFT & DIFFERENTIAL CARRIER

No.	Tool number & tool name	Description <div style="text-align: right;">Unit: mm (in)</div>	For use on	Reference page or figure No.
5.	ST3003S000 (Former Tool No. ST30030000) Drive pinion rear inner bearing puller assembly — ST30031000 Puller — ST30032000 Base	 SE041	620 521 610 510 C10	Page PD-7 Fig. PD-11 Page PD-9
6.	ST33230000 Diff. side bearing drift	 SE051	620 521 610 510 S30 C30 230 130 GC10	Page PD-10
7.	ST3110S000 Drive pinion setting gauge assembly — ST31942000 Dummy shaft — ST31101000 (Former Tool No. ST31100000) Height gauge — ST31102000 Spacer	 SE209 SE210 SE211	620 521 V610 W510	Page PD-9

PROPELLER SHAFT & DIFFERENTIAL CARRIER

No.	Tool number & tool name	Description Unit: mm (in)		For use on	Reference page or figure No.
8.	ST3194S000 Drive pinion setting gauge assembly — ST31942000 Dummy shaft — ST31941000 Height gauge			620 V610 W510	Page PD-9
9.	ST32110001 Diff. side bearing cap gauge			620 521 V610 W510 230 130	Fig. PD-20
10.	ST30611000 Drive pinion outer race drift (bar)				
11.	ST30612000 Drive pinion outer race drift (adapter)			620 610 510 S30 C30 GC10	Page PD-9
12.	ST30613000 Drive pinion outer race drift (adapter)				

PROPELLER SHAFT & DIFFERENTIAL CARRIER

No.	Tool number & tool name	Description Unit: mm (in)		For use on	Reference page or figure No.
13.	ST23510000 Solid punch	 SE058		620 610 510 S30 C30 GC10 C10	Fig. PD-14